TEST PREP on 5.3, 5.4, and 5.5 - Dr. Loveless

Test Prep Format: Reminder of the format and goals...

1. Attempt the first problem on your own (without notes, treat it like a test) for 3-5 minutes as you come in to class.
2. Compare and discuss with classmates and your TA.
3. After that switch to homework questions and/or ask about other old exam questions.

Participation Code: **Please ask your TA for the participation CODE for the day and fill out the participation quiz!** Write the CODE down now so you don't forget: CODE = _____

Notes:

- These problem comes *directly* from the Dr. Loveless old exam archive. You can find solutions in that archive.

Winter 2015 - Exam 1 - Problem 3(b) - Dr. Loveless: *Total Change*
(*this was half of a page on this exam, a good goal is to try to complete it in under 5 minutes*).

3(b). (6 pts) A particle is traveling up and down along a straight line with velocity given by $v(t) = 4t^3 - 4t$ ft/sec at time t seconds.
Find the **total distance** traveled by the particle from $t = 0$ to $t = 2$.

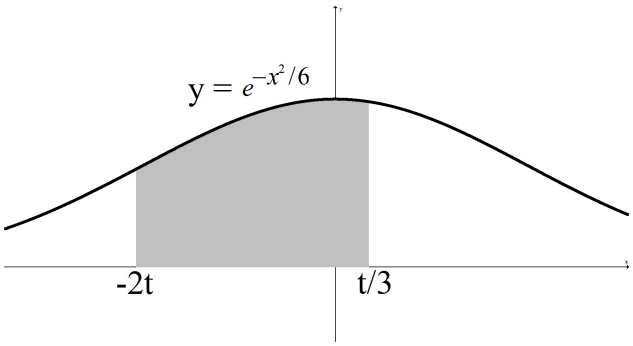
Get as far as you can get in 3-5 minutes, then check in with your TA. ***Don't forget to do the participation quiz and get the code from your TA****. Then start asking HW questions. Use the problems on the pages to follow for more studying practice on topics from this week.*

Spring 2013 - Exam 1 - Problem 3(a) - Dr. Loveless: *FTOC Part 1*

3(a). The top of a wall is in the shape of $y = e^{-x^2}$ and the bottom is the x-axis, where x and y are in feet. The wall is being painted in such a way that the area covered at time t minutes is given by

$$A(t) = \int_{-2t}^{\frac{1}{3}t} e^{-\frac{1}{6}x^2}\, dx.$$

Find the rate at which the wall is being painted at $t = 2$ minutes.
That is, find derivative of $A(t)$ at $t = 2$. (Give units)



Winter 2018 - Exam 1 - Problem 3(a) - Dr. Loveless: *FTOC Concept*

3(a). (5 pts) If $\int_0^4 f'(x)\, dx = 10$, $\int_3^4 f'(x)\, dx = 2$, and $f(3) = 13$, then what is the value of $f(0)$?

Winter 2018 - Exam 1 - Problem 1) - Dr. Loveless: *Substitution Method*

1. Evaluate the integrals. If you do a substitution in a definite integral problem, you must show me that you can appropriately change the bounds to get full credit. Simplify your final answers.

   (a) $\displaystyle\int_0^{\pi/6} \frac{\sin(2x)}{(\cos(2x))^4}\,dx$

   (b) $\displaystyle\int x^3\sqrt{x^2+5}\,dx$

Winter 2018 - Exam 1 - Problem 3(b) - Dr. Loveless: *Tomato Problem - a relatively easy one*

3(b). A tomato is thrown downward from the top of a tall building. At $t = 3$ seconds after being thrown, the tomato is at a height of 240 feet and is traveling at a *downward* velocity of 110 feet/sec. Assume the acceleration of the tomato due to gravity is $a(t) = -32$ ft/sec^2.
Find the height of the building.

Winter 2013 Honors - Exam 1 - Problem 3(a) - Dr. Loveless: *Tomato Problem - Harder*
NOTE: This is from an "honors" calculus course I taught. It is the same concept, but more involved. This is harder than what I would ask on our exam, but I hope it is a fun challenge, if you understand this, then you have a very good understanding of these sorts of problems.

5. (8 pts) A water balloon is dropped from the top of a building. You are standing exactly 300 feet directly below the water balloon when it is dropped and you plan to shoot an arrow straight up with an initial velocity of 60 feet/sec. Dr. Loveless' open window is 50 feet above you.

   How long after the balloon is dropped should you fire your arrow so that it reaches the balloon precisely when it is outside Dr. Loveless' window? Assume both the balloon and the arrow accelerate at a constant 32 feet/sec^2 downward.